adapting including adjusting said at least one controllable parameter employed in encoding said still macroblock to minimize after decoding thereof, visually perceptible pulsation artifacts between corresponding still macroblocks of adjacent frames in said sequence of video frames.

Remarks

Entry of this amendment and allowance of the application are respectfully requested.

Applicants thank the Examiner for the time afforded to them earlier this week during the telephone interview with Applicants undersigned attorney. During this telephone conference, the Final Office Action was discussed, as well as Applicants' invention as recited in the pending claims. As stated during the telephone conference, Applicants rely on their definition of "pulsation artifacts" and the meaning of a "sequence of still frames" as defined in the present application in order to distinguish the independent claims in this application from the art applied in the Final Office Action. Based upon this conference, the Examiner appeared to better understand the differences between the presently claimed invention and the art being applied. In order to further clarify the distinction, Applicants propose to amend each independent claim, as well as certain dependent claims, to state that Applicants are minimizing, after decoding of an encoded frame, visually perceptible pulsation artifacts between multiple encoded and decoded still frames of a sequence of still frames. Based on these amendments, Applicants respectfully submit that each claim presented herewith patentably distinguishes over the applied art.

Before discussing the claims at issue, Applicants wish to gratefully acknowledge the indication of allowable subject matter in dependent claims 3-6, 9, 29 & 30 if re-written in independent form including all the limitations of the base claim and any intervening claims. These claims have not been re-written herein, however, since the independent claims from which they depend are believed to recite patentable subject matter for the reasons stated below.

In the Final Office Action, claims 1, 2, 7, 8, 10-28 & 31-41 were rejected under 35 U.S.C. 103(a) as being unpatentable over Reininger (U.S. Patent No. 5,426,463) for the reasons set forth in the previous Office Action. This rejection is respectfully, but most strenuously traversed for the reasons explained during the telephone interview, and for the reasons set forth below.

No new matter is believed added to the application by the amendments presented herewith. These amendment seek to positively recite in the independent claims that the "pulsation artifacts" are visually perceptible artifacts which occur after decoding of certain encoded frames, and in particular, after decoding of a series of encoded still frames. As used in the present application, "pulsation artifacts" is the result of the **encoding and decoding process** on successive identical frames. Due to slight variations in the details in the encoded frames, visually apparent fluctuations in the decoded and displayed images may occur. These differences may give the impression of motion, and are known in the art as pulsation artifacts. Thus, while the initially received sequence of video frames may comprise a series of identical still frames in raw data format, after the still frames have undergone lossy compression and decompression (i.e., encoding and decoding) there may visually

appear artifacts in the ultimately displayed image resulting from the lossy compression and decompression of the images. The present invention is directed to minimizing these artifacts with display of the ultimate image. Again, because of the compression techniques used, a video image that is identical to the previous and next images may not be displayed identically after decompression of that image. Variations in, for example, luminance and/or chrominance data of the decoded images may falsely give the impression of movement from one image to the next. This is also referred to in the application as "apparent" movement of the still pictures.

By way of example, Applicants recite in claim 1 a method for encoding a sequence of video frames (raw data) comprising for each frame of the sequence of video frames:

> encoding the frame employing at least one controllable parameter; and
>
> adapting the encoding of the frame when the frame is a **still frame**, the adapting including adjusting the at least one controllable parameter implying to encode the still frame to **minimize after decoding thereof, visually perceptible pulsation artifacts** between still frames of a sequence of still frames within the sequence of video frames (i.e., raw data). The still frame being encoded comprises one still frame of the sequence of still frames.

In accordance with Applicants' invention, a determination is first made that a still frame in a sequence of still frames in a series of video frames has been received at the encoder. Applicants then adapt encoding of that still frame in order to minimize subsequently occurring visually perceptible pulsation artifacts between that still frame and an adjacent still frame after the frames have undergone encoding and decoding. The

problem addressed by the present invention exists when a series of identical or still frames are encoded and then decoded for display. When such frames are displayed, visually perceptible "pulsation artifacts" may occur. The present invention thus seeks to minimize these pulsation artifacts which would otherwise occur after decoding of an encoded still frame by adjusting the at least one controllable parameter employed in the encoding of that still frame.

As noted, the Office Action cites Reininger et al. as allegedly rendering obvious the independent claims of Applicants' invention. This conclusion and the characterizations of the teachings of Reininger et al. are respectfully traversed.

Reininger et al. describes a multi-pass encode system which uses the number of bits produced from encoding a macroblock as feedback to change the quantizer used on the same macroblock in the same frame in a next encode pass. If the number of bits produced for a macroblock on a pass is greater than a threshold number, then the quantizer is changed from a next encode pass.

Initially, Applicants note that Reininger et al. do not address or discuss the same problem as that to which the present invention is directed. A careful reading of Reininger et al. fails to uncover any discussion of processing still frames, let alone recognizing the pulsation artifact problem addressed by Applicants, or Applicants claimed solution to the problem. Reininger et al. address the uniformity of image quality by limiting the amount of compressed data produced by the encoding process. Applicants' invention, however, is directed to

minimizing visually perceptible pulsation artifacts occurring in a sequence of still frames which are displayed after undergoing encoding and decoding of the identical frames.

As used in the present application, a still frame is any frame in a series of received video frames that are identical in visual appearance to the previous and/or next frame. Therefore, when the images are displayed, the visual appearance should remain constant from one frame to the next notwithstanding the encode and decode processing of the data which has occurred.

In contrast, Reininger et al. disclose a system for encoding video data which includes calculating the bits produced and encoded (i.e., compressed) for macroblocks within a single frame, and using this information as feedback for further refinements in the encode process. Reininger et al. determine the number of bits produced for macroblocks within a frame, and if the size is too large, then the quantizer is changed for the subsequent encode pass. Essentially, Reininger et al. disclose a constant bit rate encode process which seeks to maintain picture quality without violating the constant bit rate. To accomplish this, Reininger et al. evaluate the same picture in compressed data format multiple times. (See column 4, lines 3 et al). Applicants respectfully submit that this process of Reininger et al. is substantially different from Applicants' recited processes.

To summarize, Applicants are addressing a problem unique from that of Reininger et al. Specifically, Applicants seek to minimize visually perceptible pulsation artifacts which occur in a displayed video stream after the stream has undergone encoding and decoding processes, and in particular, which occur where the

stream contains a series of still frames. Reininger et al. does not address or even discuss the existence of a series of still frames within a sequence of video frames, nor does the patent address the problem of visually perceptible pulsation artifacts occurring upon displaying a sequence of still frames which have undergone encode and decode processes. Applicants' invention comprises a technique for minimizing pulsation artifacts by adjusting the encode process of the frame as soon as the frame is identified to comprise a still frame. Applicants respectfully submit that a careful reading of Reininger et al. fails to uncover any teaching, suggestion or implication to one skilled in the art of such a technique.

The claims are believed to be in condition for allowance and such action is respectfully requested. If, however, the Examiner maintains any reservations regarding allowability of the claims, he is requested to telephone Applicants undersigned representative in order to schedule an interview with the inventors in order to facilitate processing of this application.

Respectfully submitted,

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